The accounts of the menhaden and mackerel fishing show that the Americans are as prone to complain of particular modes of fishing as English fishermen: the purse-seine is as obnoxious to some of them as the beam-trawl is in England, and the use of steam is at least equally unpopular. Steam is used chiefly in the menhaden fishery, and this, in combination with the purse-seine, a net practically unknown in England, has, it is alleged, utterly destroyed the menhaden fishing in certain districts. This led to petitions to Congress for the protection of the menhaden fishery, and in 1882 and 1883 the matter was inquired into, and protective legislation recommended. The evidence of actual decrease in the fishery does not appear in the Report on the fishery, but as the Commissioner of Fisheries was a member of the Committee which drew up the Report recommending legislative interference, it is to be presumed that he was satisfied that the fact of a diminution of the menhaden, due to over-fishing, was established.

Mackerel-fishing is conducted entirely by sailing-boats, most of them schooners of sixty tons register and upwards, and in these days it is carried on almost entirely by means of the purse-seine. In England, the summer fishing for mackerel is carried on by means of hand lines, and small boats may be seen "railing" or "whiffing" amongst the schools of mackerel. This method was formerly followed in America, but is now, to all intents and purposes, a thing of the past, the figures of small boats "jigging" and "drailing," as it is called in America, being given only in illustration of an obsolete industry.

The purse-seine first came into general use in 1850, but its greatest development dates only from 1870, and since the latter date there has been great opposition to its use, on the score of its destructiveness. The statistics of the mackerel-fishery do not, however, warrant this opposition. Mackerel-fishing has always been uncertain, and, as early as 1660, prohibitory laws of various kinds were passed to prevent, as it was supposed, the destruction of this industry. In 1838, twelve years before the introduction of purse-seines, the catch of mackerel was very small, and then the blame was laid on "the barbarous method of taking mackerel called gigging." The largest take of mackerel in a single year was in 1831, when 449,950 barrels of pickled mackerel were officially inspected; the second largest catch was in 1881, when 391,657 barrels were inspected. The worst catch was in 1877, when 127,898 barrels were inspected. A glance at the official tables shows that the fluctuations in the mackerel-fishery are quite independent of the usual method of fishing. The use of purse-seines might advantageously be tried in England, though it was found a failure by American schooners fishing off the Norwegian coasts, because, as it was alleged, the mackerel moved there in smaller schools than on the opposite side of the Atlantic.

In the second volume, on history and methods, English readers will find especial interest in the account of the great fur-seal industry of Alaska, which is regulated, as is well known, by a wise law prohibiting the destruction of more than a fixed number of seals every year.

No one who reads these volumes can fail to be struck with the practical national benefit of the United States Fish Commission. The production of this great work is only a small part of their active usefulness, but if it be judged by its utility alone, it is an exceedingly important part. When finished, this monograph of the fishing industry of the United States will form a complete text-book of American fisheries in all their branches, and will serve not only to interest the American public in a great national industry, but as a reliable guide to all those who are engaged in the fishing trade itself. In many cases it will be eminently serviceable as a book of reference to the practical fisherman, informing him of the localities and characteristics of fishing-grounds with which he is unacquainted, of the kinds and abundance of fish that he may expect there at different seasons, and of the best methods of prosecuting fisheries to which he is unaccustomed. Capitalists and manufacturers will learn from it how they may most profitably embark in a new industry, and the consumer will know from it how to judge of the quality of the article he consumes, and where to obtain it to the best advantage. It is impossible to refrain from drawing a comparison between this enlightened support given to an industry which from its very nature is incapable of being benefited by private effort, and the comparatively small support given by the English Government to our own fisheries, which, when the whale and seal fisheries are discounted, are at least of equal value with those of the United States. There are, indeed, signs that it is being generally recognized that the *laissez faire* policy as applied to national fisheries is a mistake. It is to be hoped that, when our Government takes another step forward, the example of the United States may not be lost sight of, and that, in addition to a central office with its necessary clerks and official administrators, a staff of skilled scientific investigators and practical men may be appointed, such as will be able to produce as exhaustive a work as that under review.

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## NOTES.

ON Friday evening last, Sir Lyon Playfair, having distributed the prizes and certificates gained by the students of the City of London College, delivered an interesting address, taking as his chief subject the need for vital improvements in English methods of education. There had been, he said, a marked change going on over the world in regard to work. Machinery had been taking the place of muscular labour. Less human labour was employed, but it was much better paid than formerly. The workman must adapt himself by trained intelligence to these changes, otherwise he would go to swell the ranks of unskilled labour. Foreign countries had been quicker awake to the changes that were going on than we had been. We were proposing technical education, while France, Germany, Belgium, and Switzerland had been adapting themselves to the altered state of things by improved schools, secondary schools, commercial, building, and other special schools, which they had been promoting for many years. Germans and Frenchmen were taking places in English counting-houses, because the youth of London had not been educated in those languages which were necessary to commerce. We were now beginning to awake to the necessity of doing what was being done in other countries. Until comparatively lately we had nothing but classical schools. The learned classes had been entirely separated from the people; but the people's knowledge of trade improved science, and science improved trade. The learned classes were ignorant of this. This was not the way that the magnificent science and literature of Greece and Rome arose. Their great philosophers were busy in commerce, and were acquiring experience and knowledge among the masses of their own countrymen. This, he was rejoiced to see, was what we were now trying to bring about in this country.

THE formation of two new Microscopical Societies has recently been announced. One of these is the Scottish Microscopical Society, meeting in Edinburgh, with the following office-bearers: President Prof. Sir W. Turner; Vice-Presidents, Prof. Hamilton and Mr. Ad. Schulze; Secretaries, Dr. A. Edington and Mr. Geo. Brook. This Society has already held two successful meetings. The other Society is the Italian Microscopical Society, intended to bring together microscopists from the whole of Italy. The subjects for research, specially mentioned in the prospectus, are animal and vegetable histology, petrology, bacteriology, and the structure of the microscope and its appliances.

AT Leyden there is a fine ethnographical collection, which is especially valuable so far as it relates to the Dutch East Indian territories. At present this collection is seen to great disadvantage, but there is some prospect that it may soon be transferred to better quarters. A Parliamentary Committee has recommended that proposals should be submitted to Parliament for the erection of a suitable building.

THE Public Free Libraries Committee of Manchester, in their annual report, just issued, state that the success which has so long attended the working of the public free libraries in that city still continues in all departments. During the last twelve months the number of readers and borrowers at the various libraries and reading rooms (*i.e.*, the number of visits they made) reached an aggregate of nearly four millions and a half (4,442,499), being over 70,000 in excess of the previous year. The number of books used for home reading and for perusal in the reading rooms was 1,649,741. In the preceding year the number was 1,606,874, the increase being 42,867. The daily average of volumes used in all the libraries was 4700. Of the volumes issued to readers at the libraries, 336,058 were read in the reference library, 507,964 in the reading rooms attached to the branches, and 64,770 in the Bradford, Harpurhey, and Hyde Road reading rooms. The number of volumes lent out for home reading was 740,949. Out of these only sixteen are missing. There are now 197,947 volumes in the libraries. The committee express regret that the limited resources at their disposal prevent the extension of branch libraries and public reading rooms, but they trust that the Council will, before long, enable them to take the necessary measures for giving effect to the resolution of the Council passed unanimously on December 21, 1887, with regard to obtaining parliamentary powers for the removal of the present restriction of the rate (a 1*d.* in the £) to be expended for library purposes.

THE following scientific lectures will probably be delivered at the Friday evening meetings of the Royal Institution before Easter, 1890:—January 24, Prof. Dewar, F.R.S., scientific work of Joule; January 31, Sir Frederick Abel, F.R.S., smokeless explosives; February 14, Prof. J. A. Fleming, problems in the physics of an electric lamp; February 21, Shelford Bidwell, F.R.S., magnetic phenomena; February 28, Prof. C. Hubert H. Parry, evolution in music; March 7, Francis Gotch, Esq., electrical relations of the brain and spinal cord; March 14, Prof. T. E. Thorpe, F.R.S., the glow of phosphorus; March 21, Prof. G. F. Fitzgerald, F.R.S., electromagnetic radiation. On Friday, March 28, a lecture will be given by Lord Rayleigh, F.R.S.

ON December 8, at 6.30 a.m., a severe shock of earthquake was felt in Upper and Central Italy, Dalmatia, the Herzegovina, and Bosnia. At Serajewo three shocks were felt, the direction being from south-east to north-west. They lasted for five seconds each.

THE inhabitants of the town of Reggio d'Emilia, in Upper Italy, are very much alarmed by the activity of the volcano, the Queccia de Salsa, which is situated about eight kilometres from the town. During the last two or three weeks it has thrown up lava, stones, and ashes.

IN the *Comptes rendus* of the French Academy of Sciences for December 9, M. Angot has published an interesting paper on the observations of temperature at the top of the Eiffel Tower. The mean monthly maxima and minima for July to November inclusive are compared with those recorded at the Parc Saint-Maur. According to the usual decrease of temperature with height, the tower observations should be about 2°·9 lower than at the ground station, but the difference is much greater in summer during the day, and much less in winter during the night. In calm and clear nights especially, the temperature has been found to be nearly 11° higher at the summit than at the base. At the time of a change of atmospheric conditions, the change is manifested some hours, or even days, at the higher station. A striking instance of this occurred in November. After a period of high pressure, with calms and easterly breezes, the wind on the surface became strong, and shifted to south-south-west, and temperature rose. But the change had manifested itself on the tower on the evening of the 21st, and during the whole period from the evening of the 21st to the morning of the 24th, the temperature at the tower was higher than at the base, at some times even exceeding 18°. Observations made by a "swinging" thermometer at 11h. a.m. on the 22nd showed that the inferior limit of the warm current was approximately between 500 and 600 feet above the ground.

THE Third Report of the Meteorological Institute of Roumania for the year 1888 shows that much progress is being made, with very scanty means, thanks to the willingness of the observers and to the voluntary assistance rendered in the preparation of the observations for publication. The Institute has been established only four years, and at the beginning of 1889 it numbered 21 stations of various classes, in addition to 42 rainfall stations. The observations are regularly published in the *Annales* of the Institute, a quarto volume of about 600 pages, about half of the volume being devoted to discussions, in French and Roumanian.

FOR a year past Mr. R. W. Schufeldt has been working at a memoir on the morphology and life-history of *Heloderma suspectum*, the well-known poisonous lizard of the south-western part of the United States. This memoir is now nearly ready for publication. Biologists have hitherto denied *Heloderma* even the rudiment of a zygomatic arch, and Dr. Günther, of the British Museum, has said in his article "Reptiles," in the ninth edition of the "Encyclopædia Britannica" (p. 451), that "the skull of *Heloderma* is very remarkable in that it has no zygomatic arch whatever." We learn from Mr. Schufeldt that his recent dissections of this lizard go to prove that such statements must be qualified. Upon examining skulls of both old and young individuals of *H. suspectum*, he has found at least a very substantial vestige of the arch in question. It consists of a freely articulated, conical ossicle, standing on the top of the quadrate, being moulded to the outer side of the posterior end of the squamosal, with which it also freely articulates. It is seen to be present upon both sides. That this is the osseous rudiment of the hinder end of the zygomatic arch in this reptile, there cannot, Mr. Schufeldt thinks, be the shadow of a doubt.

AT a recent meeting of the American Ornithologists' Union, Mr. Jonathan Dwight, Jun., read a paper on birds that have struck the statue of Liberty, Bedloe's Island, New York Harbour. He said, that, on account of its lighter colour, more birds strike the pedestal of the statue than the statue itself. The statue was erected too late in 1886 for the migratory birds. It was first struck on May 19, 1887, then late in August, when the lights were said to be put out by birds. The first date at which birds struck the statue in 1889 was August 5, when fourteen were killed. A few others were killed during the month, and a considerable number in September and October. October 24 was the last date at which birds were killed. The whole number killed this year was 690, which was considerably less than in 1888 or 1887. He found that every cold wave in the early fall was followed by migratory birds flying against the statue. Of the dead birds picked up this year, 60 per cent. belonged to one species, the Maryland yellow-throats. The remaining 40 per cent. included a great variety.

AT the meeting of the Scientific Committee of the Royal Horticultural Society on December 10, Mr. Morris read a letter addressed to the Director, Royal Gardens, Kew, by Mr. R. W.

Blunfield :—"I see in the August number of the *Kew Bulletin*, an interesting account of the *Icerya purchasi*, and its depredations in South Africa, California, &c. During the past four years our gardens at Alexandria have been invaded by a coccus, which threatens now to destroy all our trees, and is causing the greatest alarm here. . . . It first appeared about four years ago, when I noticed it in quantities on the under side of the leaves of a banyan tree, but it has since spread with extraordinary rapidity, and one of our most beautiful gardens, full of tropical trees and shrubs, has been almost destroyed. A breeze sends the cottony bugs down in showers in all directions. It seems to attack almost any plant, but the leaves of the *Ficus rubiginosa*, and one or two other kinds of fig, seem too tough for it, and it will not touch them. It seems almost hopeless here for a few horticulturists to try to eradicate this formidable pest, while their indifferent neighbours are harbouring hotbeds of it, and there will have to be some strong measures taken by law to put it down." The insect in question had been referred to Mr. Douglas, and was said to be an undescribed species of Dactylopius. Spraying with kerosene emulsion was recommended, but no remedy was likely to be effectual that was not carried out universally.

THE new number of the Journal of the Royal Horticultural Society contains a full and interesting report of the proceedings of the National Rose Conference held at the gardens of the Society at Chiswick on July 2 and 3. In the same number there are the following papers: on irises, by Prof. Michael Foster; the strawberry, by Mr. A. F. Barron; strawberries for market, by Mr. G. Bunyard; the origin of the florist's carnation, by Mr. S. Hibberd; peaches and nectarines, by Mr. T. F. Rivers; on conifers, by Mr. W. Coleman; on pears, by Mr. W. Wildsmith.

A GERMAN biography of the late Dr. E. G. F. Grisanowski, by Elpis Melena, has just been published (Hanover: Schmorl und von Seefeld). The book ought to be interesting to anti-vivisectionists, as Dr. Grisanowski was an enthusiastic advocate of their ideas, and much attention is given to the subject by his biographer.

THE United States Department of Agriculture has issued the first and second of a series of illustrated papers on the North American fauna. They are by Dr. C. Hart Merriam. The first is a revision of the North American pocket mice, and includes descriptions of twelve new species and three new subspecies. The second paper contains descriptions of fourteen new species and one new genus of North American mammals.

THE sixth edition of Mr. H. Bauerman's "Treatise on the Metallurgy of Iron" (London: Crosby Lockwood and Son) has been published. Mr. Bauerman explains that, as the progress in iron and steel manufacture during the seven years that have elapsed since the last issue of the volume has been mainly in the direction of perfecting the appliances and working details of the great processes introduced between 1858 and 1878, it has not been necessary to make any very great alteration in the principal part of the text. The additions required to bring the information up to date have been placed mostly as supplemental notes at the end. The statistical details have been revised and brought up to the latest dates for which returns are available.

IN a recent paper on zoogeography, in *Humboldt*, Dr. Lampert states that a good many wolves are still captured in the east and west provinces of Germany, *e.g.* about fifty annually in Lorraine. In France, 701 wolves were destroyed in 1887; in Norway, only 15. It is estimated that in Russia the yearly loss in domestic animals through wolves is over £2,000,000, and the loss of game from the same cause, over £7,000,000. The German mole swarms apparently, in the neighbourhood of Aschersleben, where 97,519 individuals were taken last year, and rewards amounting to £97 were paid. In great part of Germany, however (Upper and Lower Bavaria, East and West Prussia), it is not met with. Mecklenburg and Pomerania are its northern limits, at present. The beaver is nearly extinct in Germany, but a new settlement of thirty individuals was recently discovered at Regenwehrsberg, not far from Schönebeck, on the Elbe. A recent catalogue of diurnal birds of prey in Switzerland (by Drs. Studer and Fatio) gives thirty-two species. The disappearance of the golden vulture is here noteworthy. Early in this century it was met with in all parts of the Alpine chain; whereas now, only a very few individuals survive on the inaccessible heights of the Central Alps.

AN interesting inquiry into prehistoric textiles has been recently made by Herr Buschan (*Arch. für Anthrop.*) He examined tissues with regard to the raw material used, to their distribution in prehistoric Germany, to their mode of production, and to their alteration by lying in the ground. With certain chemical reagents he was able to distinguish the various fibres, though much altered. The oldest tissues of Germany (as we now know it) come from the peat-finds of the northern bronze period. On the other hand, some articles of bone found in caves of Bavarian Franks, and evidently instruments for weaving or netting (bodkins, knitting needles, &c.), show that already in the Neolithic period textiles were made. The art of felting probably preceded that of weaving. Herr Buschan sums up his results as follows: (1) in the prehistoric times of Germany, wool (mostly sheep's) and flax were made into webs, but no hemp; (2) the use of wool preceded that of flax; (3) the wool used was always dark; (4) most of the stuffs were of the nature of huckaback (none smooth); (5) the textiles have, on the whole, changed but little in course of time. The author has some interesting observations on the oldest kinds of loom. The pile-builders on the Pfaffiker, Niederwyl, and Boden Lakes, were busy weavers; and they knew how to work flax fibres not only into coarse lace, fish nets, or mats, but into such finer articles as fringes, coverlets, embroidery, and hair-nets.

IN a recent Consular Report from British North Borneo, an account is given of the explorations for gold which were made in the territories of the British North Borneo Company last year. The main obstacle had always been the difficulty of ascending the river, which is full of shallows and rapids, and of forwarding supplies of provisions, as the country is totally uninhabited, and does not afford supplies of any kind whatever. Striking into the forest at a point in Darvel Bay, which was judged to be nearest to the desired district, Mr. Skertchly crossed three sharp ridges of mountains, and at length struck the higher Segama, at a place some 250 miles inland from its mouth. The track is only 31 miles long, but great difficulty was experienced in bringing up provisions, as, owing to the rocky and mountainous nature of the ground, animals could not be used for transport, and everything had to be carried, at considerable expense, on men's backs. Payable gold was found soon after the Segama was reached, and the higher the river was ascended the more there was, but it was patchy and uncertain, and, so far, no reefs are reported, the gold being almost entirely in the river-bed. It is now certain, says the Consul, that payable gold exists, but whether the extent of country it is found in is large or small has yet to be ascertained, while the expense of conveying provisions to the gold-fields will require gold to be abundant to make it worth while working, unless an easier path is found. Mr. Skertchley was five months and a half in the forest without coming out once, and it was mainly owing to his foresight in arranging details, and his perseverance in carrying on the expedition, that success was due.

THE Annual Report of the Conservator of Forests at Singapore refers at great length to the difficulty of dealing with a grass called *lalang* (*Imperata cylindrica*, Cyr.), which is not only useless, but very injurious, both by reason of its inflammability, and because it prevents any cultivation of the land covered by it, except with a great deal of labour and expense. Wherever the land is burnt or having been under cultivation is suffered to run to waste, it is soon covered with *lalang*, whatever may have been the previous vegetation, except where the soil is sandy, or wet, or shaded by trees. The treatment of the soil by chemicals, such as salt, sulphate of iron, &c., apart from the heavy expense connected with it, is liable to have a very injurious effect, even for many years, on the plants with which the ground is afterwards afforested. The introduction of some more actively growing plant to combat and destroy the *lalang*, has been proposed, but this would be to destroy one noxious weed by another still more noxious. When trees are tall enough to throw a shade upon the ground, the *lalang* quickly disappears, nor can it penetrate even into forest glades if but a few trees bar its progress. It is suggested, therefore, that shade trees and bushes should be gradually planted.

## *OUR ASTRONOMICAL COLUMN.*

### OBJECTS FOR THE SPECTROSCOPE.

Sidereal Time at Greenwich at 10 p.m., December 26 = 4h. 22m. 20s.

| Name. | Mag. | Colour. | R.A. 1890. | Decl. 1890. |
|---|---|---|---|---|
| | | | h. m. s. | ° ′ |
| (1) G. C. 839 ... ... | — | — | 4 15 32 | +19 7 |
| (2) 47 Eridani ... ... | 5 | Reddish-yellow. | 4 28 54 | − 8 25 |
| (3) ε Tauri ... ... ... | 4 | Whitish-yellow. | 4 22 12 | +18 56 |
| (4) μ Eridani ... ... | 4 | White. | 4 40 0 | − 3 27 |
| (5) R Leporis ... ... | Var. | Red. | 4 54 36 | −14 56 |
| (6) U Geminorum ... | Var. | Variable. | 7 48 34 | +22 17 |
| (7) Neptune, Dec. 26.. | — | Greenish. | 4 2 21 | +18 59 |
| ,, Jan. 2 ... | — | — | 4 1 44 | +18 57 |

*Remarks.*

(1) This is described in the General Catalogue as an exceedingly interesting object, but very faint and small; according to Hind it is variable. I have not been able to find any record of its spectrum. Continuous observations over a considerable period, even with small dispersion, may throw light upon the nature of the changes which take place.

(2) A star of Group II., in which Dunér records the bands 2–8. Bands 2 and 3 are the strongest, indicating that the star is well advanced in condensation towards Group III. As in similar stars, dark metallic lines and lines of hydrogen should receive special attention, as the stages at which these make their appearance have not yet been determined.

(3) Vogel classes this with stars of the solar type, and the usual differential observations are suggested. (For criteria, see p. 20.)

(4) According to Konkoly, this is a star of Group IV. The usual observations of the relative intensities of the hydrogen and metallic lines are required, so that the star may be placed in line with others on the temperature curve.

(5) This is a variable star of Group VI., but the range of variation is small (6·5–8·5). The origin of variability in stars of this group has not yet been satisfactorily explained, and there is no record of the spectroscopic changes which accompany the changes in magnitude. Further observations are therefore necessary, and it is suggested that variations in the intensities of the carbon flutings should be particularly noted. The star was at minimum on October 23.

(6) This variable reached its maximum on December 21, and, as the period is only 86 days, observations may be made from maximum to minimum, providing that sufficient optical power is employed. The magnitude ranges from about 9 at maximum to 14 at minimum. The colour is stated to vary from white at maximum to reddish at minimum. The spectrum has been described as continuous (probably near maximum), but the colour-changes indicate that considerable variations in the spectrum may also be expected.

(7) The spectrum of Neptune was first observed by Secchi, in 1869. He noted that there were three broad dark bands, which were nebulous at the edges, and that there was a remarkable absence of red light. Vogel gave a more detailed account of the spectrum in 1872 (*Bothkamp Beobachtungen*, 1872, p. 71). The bands then recorded were as follows:—

| Wave-lengths. | Remarks. |
|---|---|
| 597 ... ... | End of spectrum. |
| 565·7 ... ... | End of a wide dark band. |
| 556 ... ... | Very feeble band. |
| 540 ... ... | Middle of the darkest band. |
| 518 ... ... | Faint band. |
| 513 ... ... | ,, |
| 507 ... ... | ,, |
| 485·8 ... ... | Middle of a dark band. |
| 477 ... ... | Middle of a wide dark band. |

The whole spectrum is very similar to that of Uranus. The proximity of the edges of some of the dark bands to the bright flutings of carbon and manganese led Prof. Lockyer to suggest that in Uranus and Neptune we might have to deal with the radiation of those substances, the dark bands being produced by contrast. Acting on this suggestion, I made observations of Uranus with a 10-inch equatorial, and afterwards, in conjunction with Mr. Taylor, with Mr. Common's 5-foot reflector. Direct comparisons certainly showed coincidences of the flutings of carbon with luminous parts of the spectrum. No solar lines were visible, but Dr. Huggins has recently photographed the spectrum, and found nothing but solar lines. In a recent observation of Neptune, I thought the bright flutings were more evident than in Uranus, but I have not had an opportunity of making comparisons. Further observations with reference to the existence of bright flutings are suggested. A. FOWLER.

VARIABLE STAR IN CLUSTER G.C. 3636.—Prof. Pickering writes (*Astr. Nachr.*, 2941) that photographs are being taken at Wilson's Peak, Southern California, with a telescope of 13 inches aperture. Four photographs, with exposures of about one hour each, were taken of the above cluster, whose position for 1900 is R.A. 13h. 37m. 35s., Decl. + 28° 52′·9. A star about twenty seconds south of the centre of the cluster was found to be much brighter on May 21 and June 8, 1889, than on May 31 and June 17, 1889. Two maxima seem to be indicated by the photographs separated by an interval, during which the star becomes comparatively faint. Visual observations made at Cambridge Observatory since June appear to confirm this variability.

CHANGES IN LUNAR CRATERS.—A few observations made by Prof. Thury (*Astr. Nachr.*, 2940), of craters in the terraced ring of Plinius, indicate some striking changes. On November 1, Plinius presented the same aspect as that described in 1882 by MM. Elger, Gaudibert, and H. Klein. Two craters, cutting one another, appear in the middle of the ring, and it is thought that one of these was not visible in the middle of September. The central opening seems to have been enlarged, for on November 1 its diameter was estimated as at least one-third of the total crater, whereas in September the diameter of the opening was rather less than one-fourth of the total diameter.

The interpretation put by Prof. Thury upon these appearances is that in the centre of Plinius there are two small craters, the aspect of which is modified by the different amounts of snow and ice about them. Emissions of heated gas and vapour would affect considerably the state of the lunar surface, for if, in the beginning of an eruption, water-vapour were predominant, it would be immediately condensed around the crater, forming a circular field of snow, so that the apparent enlargement of the opening may be due to the melting of the snow surrounding it by the hot gases emitted.

## *ON THE FUTURE OF OUR TECHNICAL EDUCATION.*

LAST week we referred to an address delivered by Sir Henry Roscoe at Goldsmiths' Hall on Tuesday, December 17, after the distribution of the prizes and certificates to the students of the City and Guilds of London Institute. He spoke as follows:—

In his admirable address delivered last year on a similar occasion to the present, Sir Lyon Playfair pointed out that one of the important objects for which the City Guilds were originally founded was to develop and restore arts and sciences,